Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Actions to Accelerate Adoption and Accessibility of Broadband-Enabled Health Care Solutions and Advanced Technologies	)	GN Docket No. 16-46

COMMENTS OF GE HEALTHCARE

GE Healthcare ("GEHC") hereby submits these comments in response to the *Public Notice* issued by the Federal Communications Commission ("FCC" or "Commission") on April 24, 2017, in the above-captioned proceeding.[1] The *Public Notice* seeks comment on how the FCC can help enable the adoption and accessibility of advanced healthcare solutions.[2]

As explained below, the FCC can encourage advanced healthcare solutions by ensuring that licensed Wireless Medical Telemetry Service ("WMTS") systems operating on television channel 37 ("Channel 37") are protected from harmful interference and that a sufficient amount of spectrum exists to meet the nation's growing demand for safety-of-life wireless medical telemetry operations. To protect these safety-of-life systems from harmful interference, the FCC should revise the Channel 37 WMTS separation distances devised in its *2015 Part 15 R&O* and address concerns about the dependability of white space device and database software. To ensure that sufficient spectrum is available, the FCC should grant TerreStar's pending waiver request regarding certain of its 1.4 GHz licenses and consider auctioning spectrum in the 1.3

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[1] *FCC Seeks Comment and Data on Actions to Accelerate Adoption and Accessibility of Broadband-Enabled Health Care Solutions and Advanced Technologies*, Public Notice, FCC 17-46 (rel. Apr. 24, 2017) ("*Public Notice*").

[2] *See id*. at 1, 9.

GHz band for commercial use. In addition, the FCC can encourage the development of other advanced healthcare solutions, such as those that rely on 5G networks and applications, by addressing concerns about interoperability and other potential barriers to network deployment.

1. Connected Hospitals Throughout the Country Rely on WMTS for Patient Monitoring.

The Commission has long recognized the "importance of WMTS to patient care" and the critical need to protect its "safety-of-life" operations from harmful interference. [3] WMTS empowers healthcare providers, such as a hospital's doctors and nurses, to wirelessly monitor patients' physiological data and has played a transformative role in healthcare.[4] WMTS offers patients "significant benefits . . . in terms of mobility and comfort," as the FCC has observed.[5] WMTS also represents a "significant tool" that can be used by both patients and providers to reduce healthcare costs."[6]

Hospitals and other healthcare facilities across the country routinely use WMTS to monitor patient data in real-time and detect life-threatening events (*e.g.*, cardiac arrhythmias and apneas).[7] In fact, the American Society for Healthcare Engineering of the American Hospital Association ("ASHE") estimates that more than 2,700 unique locations have deployed WMTS

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[3] *See, e.g.*, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd 6567 ¶ 275 (2014).

[4] *See, e.g.*, GEHC Comments, ET Docket No. 14-165, GN Docket No. 12-268, at 3-4 (Feb. 4, 2015) ("GEHC Feb. 4, 2015 Comments").

[5] *Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service*, Order, 16 FCC Rcd 4543 ¶ 2 (2001).

[6] *Id.*

[7] *See, e.g.*, GEHC Feb. 4, 2015 Comments at 3-4; GEHC Comments, GN Docket No. 12-268, at 1 (Jan. 25, 2013).

systems.[8] Moreover, the number of healthcare facilities that rely on WMTS is expected to increase significantly as hospitals and others adapt to an aging U.S. patient population and increased patient acuities.[9]

Wireless medical telemetry thus plays a pivotal and growing role in U.S. healthcare. Indeed, as the *Public Notice* points out, many have advised the Commission that additional spectrum will be needed to keep up with the growing demand for such services.[10] Just as important to the continued adoption and deployment of wireless medical telemetry technologies, however, is protecting existing WMTS systems from harmful interference, such as interference from white space devices operating on the same channel.

2. The FCC Should Revise the Part 15 WMTS Separation Distances and Ensure White Space Device and Database Software Dependability to Protect Hospitals' Patient Monitoring Systems.

On August 11, 2015, the FCC adopted technical rules for the use of personal/portable and fixed white space devices on Channel 37, including a set of co-channel separation distances that are intended to prevent these unlicensed devices from causing harmful interference to incumbent WMTS systems.[11] Unfortunately, the FCC based its separation distances on a flawed methodology and underestimated the geographic separation required to protect WMTS systems.

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[8] ASHE is the FCC-designated WMTS frequency coordinator. *See* GEHC Feb. 4, 2015 Comments at 3; *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, 27 FCC Rcd 12357 ¶ 210 (2012).

[9] *See, e.g.*, GEHC Feb. 4, 2015 Comments at 3; Research and Markets, Cardiac Monitoring And Diagnostic Devices - Global Trends, Estimates and Forecasts, 2012-2018 (June 2014), http://www.researchandmarkets.com/reports/2882672/cardiac-monitoring-and-diagnosticdevices.

[10] *See* Public Notice at 14; *see also, e.g.*, ASHE Comments, WT Docket No. 16-290, at 2-3 (Oct. 4, 2016); Philips HealthCare Reply Comments, WT Docket No. 16-290, at 2 (Oct. 14, 2016).

[11] *See Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, et al.*, Report and Order, 30 FCC Rcd 9551 ¶¶ 200-21 (2015) ("Part 15 R&O").

For example, the FCC erroneously assumed that WMTS receive antennas operate at a height above ground level of 10 meters or less. The FCC also incorporated height above average terrain into its analysis in a way that leads to absurd results in many cases.[12] In addition, the FCC neglected to include a factor for the Signal to Noise Ratio ("SNR") required by WMTS radios when it should have used a minimum SNR of approximately 10 dB.[13] Instead, the FCC assumed that reliable operation of WMTS radios could occur at signals that are at the receiver sensitivity and then applied an I/N of -6 dB to that value.

GEHC filed a petition for reconsideration of the *Part 15 R&O* on December 23, 2015, urging the FCC to correct material errors and adopt new separation distances that will, in fact, protect WMTS systems from interference from white space devices operating on Channel 37.[14] A year and a half has passed since, but the petition remains pending.

Others raised similar concerns. For example, the WMTS Coalition filed a separate petition for reconsideration, warning that the FCC's methodology "is flawed, leading to distances that are too small to assure that interference will not occur to many hospitals."[15] A bipartisan group of 16 Congressmen wrote the FCC prior to the FCC's August 2015 decision, noting that the record in the proceeding included "the results of real-world testing at three different hospitals demonstrating that interference to WMTS systems would be caused by a TVWS device

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[12] *See, e.g.*, GEHC Petition for Reconsideration, ET Docket No. 14-165, GN Docket No .12-268, at 6-12 (Dec. 23, 2015) ("GEHC Petition").

[13] *See id*. at 4, 23-24.

[14] *See id*.

[15] *See* WMTS Coalition Petition for Reconsideration, ET Docket No. 14-165, GN Docket No. 12-168, at 8 (Dec. 23, 2015).

operating at the power-levels and distances proposed by the Commission."[16] And, in his statement on the August 2015 decision, Chairman Pai observed that "the FCC's technical analysis is based on the assumption that hospitals with WMTS devices are no more than three stories tall . . . [b]ut the record shows that a majority of hospitals with WMTS devices are taller than that."[17]

The FCC should correct these errors to ensure a safe radiofrequency environment for WMTS operations on Channel 37. As a safety-of-life service, WMTS cannot tolerate even small or episodic incidents of interference. For example, a single source of interference can cripple an entire WMTS system and be extremely difficult to identify, while endangering patients and diverting the attention of hospital staff. Given this sensitivity to interference and the safety-of-life nature of WMTS, the Commission should maintain its commitment to being "conservative in [its] determination of protection distances to protect WMTS."[18]

Additionally, the FCC should address the critical weaknesses that threaten to undermine the overall integrity of the white space geolocation/database system to ensure that it can fully protect hospitals and other healthcare facilities. For example, the FCC should adopt safeguards to ensure that the software upon which the white space geolocation/database system depends – in particular, that which will reside in white space device – will consistently operate as intended. The FCC's white space database regime entails a massive and complex, autonomous real-time distributed system (the "WSAS"), yet its dependability remains a key issue, as GEHC has

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[16] *See* Letter from Hon. Greg Walden et al. to Hon. Tom Wheeler, Chairman, FCC, OL Docket No. 15-9 (dated July 31, 2015).

[17] *Part 15 R&O*, Statement of Commissioner Pai.

[18] *See Part 15 R&O* ¶ 202.

previously explained.[19] Although the FCC has recognized software concerns as they relate to software defined radios, it has failed to adequately address them as they relate to white space devices and the related database.[20]

3. The FCC Should Make Additional Spectrum Available for Wireless Medical Telemetry, Including by Granting TerreStar's Waiver Request and Auctioning Spectrum in the 1.3 GHz Band.

The Commission can help address the growing need for additional wireless medical telemetry spectrum by, among other things, granting TerreStar's request to use its licensed spectrum to support wireless medical telemetry operations in the 1390-1392, 1392-1395, and 1432-1435 MHz bands.[21] This additional spectrum would increase the capacity for such 1.4 GHz operations by approximately 67 percent.[22] The spectrum is also well situated, as it is adjacent to two bands that are already used for WMTS.[23]

The 1392-1395 MHz band could be used for innovative wireless medical telemetry applications outside of healthcare facilities.[24] The 1432-1435 MHz band would fit neatly into the current framework for WMTS under Part 95 of the FCC's rules.[25] And TerreStar's planned registration process and frequency coordination database (which is similar to the existing WMTS

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[19] *See, e.g.*, GEHC Comments, ET Docket No. 16-56, at 5-9 (May 6, 2016) ("GEHC May 6, 2016 Comments"); GEHC Consolidated Reply, ET Docket No. 14-165, GN Docket No. 12-268, at 5-7 (filed Mar. 10, 2017); GEHC Petition at 36-42.

[20] *See, e.g.*, GEHC May 6, 2016 Comments at 7-8.

[21] *See* TerreStar, Request for Temporary Waiver of Substantial Service Requirements, WT Docket No. 16-290, at ii (Aug. 12, 2016) ("TerreStar Request").

[22] *See, e.g.*, *id.* at 1-2.

[23] The 1395-1400 and 1427-1431.5 MHz bands are currently dedicated to WMTS. *See, e.g.*, *id.* at 8.

[24] It may be necessary to limit use of this spectrum within hospitals to protect WMTS systems operating above 1395 MHz from harmful interference. *See, e.g.*, *id*. at 16.

[25] *See, e.g.*, *id.* at 2. GEHC believes that ultimately at least the 1432-1435 MHz portion of the TerreStar spectrum should be folded into the existing WMTS rules under Part 95 via a separate rulemaking proceeding.

database) has the potential to make wireless medical telemetry expansion into this spectrum relatively seamless for healthcare providers.[26]

TerreStar would not be able to support wireless medical telemetry with this spectrum without a temporary waiver of its substantial service requirements.[27] It could take up to three years for TerreStar, equipment manufacturers, and healthcare providers to develop, test, and deploy wireless medical telemetry systems that can viably operate on the spectrum.[28] The FCC may also need time to develop technical rules to ensure that existing and future 1.4 GHz WMTS systems remain protected from harmful interference, which it should do before allowing TerreStar's spectrum to be used for wireless medical telemetry.[29]

In addition, the FCC should consider auctioning spectrum in the 1.3 GHz band for commercial use. For example, a multi-agency group is currently considering whether it would be feasible to free up spectrum in the 1300-1350 MHz band for commercial use by relocating the Federal Aviation Administration's long-range radars.[30] If, in fact, this or other spectrum in the 1.3 GHz band can be made available, then offering it at auction for commercial use could be one way to help meet the growing spectrum needs of next-generation health technologies and medical devices.

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[26] *See, e.g., id.* at 17-19. Ultimately, this will depend on factors that have not been determined yet, such as the rates charged to access the spectrum the length of lease terms. *See, e.g.*, GEHC Comments, WT Docket No. 16-290, at 3-4 (Oct. 4, 2016) ("GEHC TerreStar Comments").

[27] *See, e.g.*, TerreStar Request at 2-3.

[28] *See, e.g., id.* at 27.

[29] These rules should specify, for example, whether the Commission's typical approach of affording authorized spectrum users "first-in-time" interference protection rights should be re-examined. *See, e.g.*, GEHC TerreStar Comments at 4.

[30] *See* Glenn Reynolds, National Telecommunications & Information Administration, *Sizing up Spectrum Sharing Prospects* (Nov. 17, 2016), https://www.ntia.doc.gov/blog/2016/sizing-spectrum-sharing-prospects.

4. Promoting Medical Device Interoperability Will Encourage the Deployment of Advanced Healthcare Solutions, Including 5G Applications.

The *Public Notice* asks commenters to identify regulatory barriers and incentives regarding the deployment of radio frequency-enabled healthcare technologies and devices, including whether there are issues of concern with respect to interoperability.[31] GEHC agrees that medical device interoperability drives innovation in the healthcare space.[32] Establishing appropriate functional, performance, and interoperability requirements for connected devices will help promote patient safety and the deployment of advanced healthcare technologies. Such efforts are best accomplished by medical device manufacturers and users working in concert through consensus industry standards bodies. The FCC and other regulators can incentivize these stakeholders simply by recognizing and promoting such approaches, guidelines, and standards. Examples include: IEC 80001-1, HL7, DICOM, IHE Profiles, and IEEE 11073 Medical Device Communications.

The Food and Drug Administration ("FDA") sought comment in January 2016 on draft guidance that would provide medical device manufacturers with design considerations when developing interoperable devices.[33] The FDA explained that "[i]nteroperability in healthcare has the potential to encourage innovation and facilitate new models of health care delivery."[34] The

[31] *See Public Notice* at 8, 10-12.

[32] *See, e.g.*, GEHC Comments, Docket No. FDA-2015-D-4852 (Apr. 28, 2016) ("GEHC FDA Comments").

[33] FDA, *Design Considerations and Pre-market Submission Recommendations for Interoperable Medical Devices*, Draft Guidance (Jan. 26, 2016), *available at* http://bit.ly/2qMtFC1.

[34] *Id*. at 2.

FDA's draft guidance does not address compatibility issues with physical connections, however.[35]

Given the limited scope of the FDA's proposed draft guidance, there is ample opportunity for the FCC to play a role in promoting medical device interoperability. By removing obstacles that impede deployment, such as interoperability concerns, the FCC can spur the development of next-generation healthcare technologies. These include 5G applications, such as Narrowband IoT and MulteFire. For example, enabling small scale 5G test networks in advance of full scale nationwide deployments will encourage development and testing of potential healthcare applications that use both Wi-Fi and 5G technologies to enable seamless connectivity between the hospital and home. Over time, 5G applications could help create a world where "real-time health services [are] the norm rather than the exception" and help overcome disparities in healthcare that are rooted in geography or a patient's income.[36]

5. Conclusion

GEHC appreciates the Commission's commitment to improving healthcare in the U.S. by promoting advanced healthcare technologies and devices. The Commission can further this goal by protecting existing safety-of-life WMTS systems on Channel 37 from harmful interference from unlicensed devices. It can also further this goal by making spectrum licensed to TerreStar in the 1.4 GHz band available for wireless medical telemetry operations, auctioning spectrum in the 1.3 GHz band for commercial use, and encouraging the development of additional advanced

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[35] *See id*. at 4.

[36] *See* Darrell M. West, *How 5G Technology Enables the Health Internet of Things*, Center for Technology Innovation at Brookings (July 2016), http://brook.gs/2bsYDY9.

healthcare solutions by addressing interoperability concerns and other potential barriers to deployment.

Respectfully submitted,

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